Algebra 2/Trig1
Chapter 11 Review

Name Key
Block _____ **Date** _____

Find the pattern, then tell whether the sequence is *arthimetic, geometric*, or *neither*. Then, write the formula. Then find the given term.

(1) –1, 1, 3, 5, ...
pattern: +2
type: arith.
formula: $a_n = -1 + 2(n-1)$

(2) 729, 243, 81, 27, 9 ...
pattern: ÷3
type: geom.
formula: $a_n = 729 \cdot (1/3)^{(n-1)}$ or $\frac{729}{3^{(n-1)}}$

(3) 2, 4, 8, 16, ...
pattern: x2
type: geom.
formula: $a_n = 2 \cdot 2^{(n-1)}$

(4) 10, 5, 0, -5, -10 ...
pattern: -5
type: arith.
formula: $a_n = 10 - 5(n-1)$

Write the first six terms of the sequence.

5. $a_n = n + 2$
$a_1 =$ 3
$a_2 =$ 4
$a_3 =$ 5
$a_4 =$ 6
$a_5 =$ 7
$a_6 =$ 8

6. $a_n = n(n + 1)$
$a_1 =$ 2
$a_2 =$ 6
$a_3 =$ 12
$a_4 =$ 20
$a_5 =$ 30
$a_6 =$ 42

7. $a_n = 3n$
$a_1 =$ 3
$a_2 =$ 6
$a_3 =$ 9
$a_4 =$ 12
$a_5 =$ 15
$a_6 =$ 18

Write the next 3 terms and then write the rule (formula) for the n^{th} term (a_n). Lastly, find the term indicated.

(8) 5, 10, 15, 20, ...

next 3 terms: 25, 30, 35

Formula: $a_n = 5 + 5(n-1)$

a_{15} = 75

(9) 3, 7, 11, 15, ...

next 3 terms: 19, 23, 27

Formula: $a_n = 3 + 4(n-1)$

a_{20} = 79

(10) 9, 12, 15, 18, ...

next 3 terms: 21, 24, 27

Formula: $a_n = 9 + 3(n-1)$

a_{35} = 111

(11) 3, 9, 27, 81, ...

next 3 terms: 243, 729, 2187

Formula: $a_n = 3 \cdot 3^{(n-1)}$

a_9 = 19,683

(12) 5, 4, 3, 2, ...

next 3 terms: 1, 0, -1

Formula: $a_n = 5 - 1(n-1)$

a_{18} = -12

(13) $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots$

next 3 terms: $\frac{1}{32}, \frac{1}{64}, \frac{1}{128}$

Formula: $a_n = \frac{1}{2} \cdot \left(\frac{1}{2}\right)^{(n-1)}$ or $\frac{1/2}{2^{(n-1)}}$

a_{12} = 2.44×10^{-4}

Write the rule (formula) for the sequence given the following.

(14) $r = 0.4$, $a_1 = 5$

$a_n = 5 \cdot (0.4)^{(n-1)}$

(15) $d = 5$, $a_1 = 1$

$a_n = a_1 + d(n-1)$

$a_n = 1 + 5(n-1)$

(16) 36, 18, 9, ...

$a_n = \frac{36}{2^{(n-1)}}$ or $36\left(\frac{1}{2}\right)^{(n-1)}$

Write the following sequences in sum notation by following the steps.

(23) 4, 20, 100, 500, 2500

Pattern: $\times 5$

Formula: $a_n = 4 \cdot 5^{(n-1)}$

Sum Notation:

$$\sum_{i=1}^{5} 4 \cdot 5^{(i-1)}$$

(24) 8, 14, 26, 32, 38, 44, 50

Pattern: $+6$

Formula: $a_n = 8 + 6(n-1)$

Sum Notation:

$$\sum_{i=1}^{8} 8 + 6(i-1)$$

(25) 2, -4, 8, -16, 32, -64, 128, -256

Pattern: $\times -2$

Formula: $2 \cdot (-2)^{(n-1)}$

Sum Notation:

$$\sum_{i=1}^{8} 2 \cdot (-2)^{(i-1)}$$

(26) 10, 4, -2, -8, -14, -20

Pattern: -6

Formula: $a_n = 10 - 6(n-1)$

Sum Notation:

$$\sum_{i=1}^{6} 10 - 6(i-1)$$

Find the sum of the series. Be sure to show all work!

17. $\sum_{i=1}^{50} i \Rightarrow \frac{50(51)}{2} = 1275$ formula

18. $\sum_{i=5}^{12} (3i+1) = 16 + 19 + 22 + 25 + 28 + 31 + 34 + 37 = 212$

19. $\sum_{i=1}^{10}(5-i) = 4+3+2+1+0+-1+-2+-3+-4+-5 = -5$

20. $\sum_{i=1}^{11} i^2 = \frac{11(11+1)(2\cdot 11+1)}{6} = \frac{11(12)(23)}{6} = 506$

formula

21. $\sum_{i=1}^{52} 3+5(i-1)$ ← n, $a_1 + d(i-1)$

$Sum = \frac{52(3+a_{52})}{2} = 6786$

$a_{52} = 3+5(52-1) = 258$

arith.

22. $\sum_{i=1}^{7} 5\left(\frac{1}{3}\right)^{(i-1)}$ ← n, $a_1 \cdot (r)^{(i-1)}$

$Sum = 5\left(\frac{1-\frac{1}{3}^{7}}{1-\frac{1}{3}}\right) = 7.4966$

geom

23. $\sum_{i=1}^{21} 100-2(i-1)$ ← n, $a_1 + d(i-1)$

$Sum = \frac{21(100+a_{21})}{2} = 1680$

$a_{21} = 100-2(21-1) = 60$

arith

24. $\sum_{i=1}^{33} 3(2)^{(i-1)}$ ← n, $a_1(r)^{(i-1)}$

$Sum = 3\left(\frac{1-2^{33}}{1-2}\right) = 2.577 \times 10^{10}$

geom

Application problems:

25. A set of bleachers has 30 rows, with 10 in the first row, 12 in the second row, 14 in the third row, and so on. How many seats are there in the stadium?

$10, 12, 14, \ldots$

$a_n = 10 + 2(n-1)$

$\sum_{i=1}^{30} 10 - 2(i-1)$

$\text{Sum} = \frac{30(10 + a_{30})}{2}$

$a_{30} = 10 + 2(30-1)$
$= 68$

$= \frac{30(10+68)}{2}$

$= 1170$

26. If a bank account was originally opened with $5,000 and increases in value by 4% per year, how much will the account be worth after 20 years?

$a_n = 5000 \cdot 1.04^{(n-1)}$

$a_{20} = 5000 \cdot 1.04^{(20-1)}$

$= \$10,534.25$

27. A house is currently worth $540,000. With the bad housing market, it decreases in value 3% per year. How much will the house be worth after 10 years?

$a_n = \$540,000 \cdot 0.97^{(i-1)}$

$a_{10} = 540,000 \cdot 0.97^{(10-1)}$

$= \$410,524.77$